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ABSTRACT

The starting point of this study is a post-structural feminist position that asks questions in order to examine the social conditions of a group from the participants' perspective and experience. The five participants in this study were working in a traditionally feminized field (teaching), but their subject matter (science) has been traditionally masculinized. Four recurring themes appeared in the data from transcribed interviews: (1) contradictory self-descriptions, i.e., the teachers described how they perceived themselves by explaining what they were not; (2) issues of control, i.e., control over students, control over their jobs, and even loss of control; (3) notions of autonomy, which centered around the teachers' movement into the profession, decision making, and the politics of their departments relative to other departments; (4) these teachers' views about the epistemology of science and their place within science. All five teachers described science in a mechanistic, experiment-driven way, akin to the traditional masculinist representations of the domain. (Contains 33 references). (SM)

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Gender (in)forms self images:

The case of five male secondary science teachers

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In 1981, Jane Roland Martin wrote about the contradiction that has existed throughout history with regards to "the educated woman." Noting that education was the path to rationality and objectivity, and that women were viewed as trapped in a world of feelings and emotions, Martin cited philosophical examples throughout history that pointed out this perplexity. Although these ideas had been around for years, Martin singled out John Stuart Mill's reformulation of the "puzzle," for he was one of the first to pin these notions to culture rather than on nature. In a collection of essays that came out originally throughout the 1980's, Martin (1994) further investigated this apparent contradiction. The message throughout history has been clear: Emotions could only enter the head of an educated person in the form of passion for one's work, they could not enter into one's work.

This notion seems somewhat ironic in modern times because women have traditionally made up the vast majority of the teaching force. So while throughout history they were not worthy of an education, in modern times they were "destined" (largely through no choice of their own) to be teachers. Teaching was viewed as women's true profession- one where they could use their "natural" skills and talents as nurturers and caretakers to their best advantage. Men, on the other hand, were seen as lacking these innate abilities, and were therefore less equipped to deal with small children, if not all children. Laird (1988) notes that this distinction, of teaching as women's true profession, is systematically ambiguous and contradictory, but nonetheless culturally pervasive. Lortie (1975) offered several factors for the feminization of teaching, from economic to organizational, noting that women dominated the field because men refused to enter it, preferring instead higher paying, higher status jobs.

Layered on top of this feminization of teaching is the apparent tension that arises when a female teacher teaches in a subject area, such as math or science, that has traditionally been seen as a male domain. This is certainly true about science. Since the late

1970's, critiques have proliferated regarding the masculine bias that was evident not only in the practice of science, but also in the structure of science (Bordo, 1987; Harding, 1986, 1991; Kelly, 1987; Reed, 1978; Russett, 1992; and Schiebinger, 1989). Not only is science constructed from a masculine standpoint, but the ways in which it is taught seem to favor learning by boys over learning by girls (Kahle, 1985). As Barton et al. (1995) note, the "traditional image of science as unemotional, detached, and politically unbiased has crumbled under feminist critique". Nonetheless, science is still a domain dominated by males, both in industry and academia, and little has yet been done to change its practice, let alone to change its fundamental structure.

This, then, leads to what can be called the contradiction of the woman science teacher. With one foot in the feminized domain of teaching and one foot in the masculinized domain of science, these women experience a unique set of tensions. This was highlighted in Scantlebury (1993), whose 'likely story' of Ann depicts these tensions that pull in opposing directions. Barton et al. (1995) use the term 'hybrid' to describe themselves in this position; they feel they are expected to be hybrids of women and men, or at least hybrids of feminine and masculine qualities. They note, "we have been expected to live as hybrids because science and women-ness are not supposed to mesh" (p. 6). They further believe that entering science education may be an act of resistance by women to the science community that they are somehow not a part of. These authors, graduate students and professors, saw an opportunity within science education to make "science experiences more liberating, empowering, and 'agentic'" for their students than it had been for them (p. 7).

This study arose out of my own wonderings about this apparent contradiction. If it held true for these women, which their poignant and impassioned personal accounts testified to, then I wondered what the situation was like for the male science teacher. They too, perhaps, felt tensions in the same way, but with different effects. They were men in a traditionally feminized field, but their subject matter was traditionally masculinized. While

there may not be a direct parallel, or any relationship at all, I couldn't help wondering what was going on in these situations. Allen (1993) has already documented that elementary teaching was viewed as a suspect occupation for men to enter. These results are echoed by other researchers, also (DeCorse & Vogtle, 1997; Sikes, 1991; Williams, 1995). I wondered if this was true of secondary teaching. This curiosity, coupled with the reality that Silverman (1993) describes as "hardly any attention has been paid by researchers to questions of male gender" (p. 35), catalyzed my study.

Before describing the study in greater detail, I want to describe the theoretical framework from which I started my more formalized wondering, and also to define (or at least help clarify) the concept of gender as I am using it in this exploration. Following the framework as described by Weedon (1987), this study started from a post-structuralist feminist framework. I purposefully chose this as an organizing template, because it necessitated that I make explicit certain issues, such as power relations, that I might otherwise have found easier and more convenient to ignore. This framework compelled me to problematize the relationship between men, masculinity, and schooling, and to re-examine it from the standpoint of the male teacher. Further, as Harding (1991) describes, this standpoint allowed for contradictions and resistances, recognized a multiplicity of positionings based on the context of the interaction, and enabled my voice to enter the study. I purposefully started from a post-structural feminist position because it asks questions in order to examine the social conditions of a group from their perspective, starting with these teachers' worlds (Harding, 1991).

I hope that my methodology allowed for some of what Hollingsworth (1994) referred to as the equal vulnerability between the 'researcher' and the 'researched'. This calls for a critical perspective on my role as investigator, which will be discussed later in the paper, because I am not an invisible, anonymous voice of authority, but rather a participant in the meaning-making (Harding, 1986). Far from being an observer or passive

listener, this research demands that I be involved "with both the 'research subject' and with changing those conditions that seek to silence and marginalize" (Tierney, 1993, p. 5).

I was cautious not to overinvest in this framework, however, as if it were the only way to examine these issues. As Seidler noted,

> A study of men and masculinity will yield its own methodological concerns. These questions will not always lie within feminist theory, nor can we say in advance what they might be . They cannot be judged according to preexisting feminist standards, but if they are firmly grounded they will also deepen our understanding of the sources of women's oppression and subordination. They will also illuminate the conditions and possibilities of changing conceptions of masculinity, if not also the conditions for the 'liberation' of men. (1994, p. 120).

So while I realize the power of feminism to "challenge the power of science to liberate rather than dominate" (Barton et al., 1995, p. 5), I am not beholden to this single framework, and may willingly move outside of it to examine issues that arise from this work.

I want this work to allow me to try to tap into "the ways in which science and science teaching perpetuate constructions of, and understandings about 'appropriate' femininity and masculinity" (Hildebrand, 1995, p. 6). Hildebrand's own work re/visioning gender has inspired me to try, within this post-structuralist feminist framework, to start the long process of investigating how these teachers "continually negotiate, resist, challenge, and reproduce meanings" (Hildebrand, 1995, p. 6) through their lives and their work. Surely this exploration is just a start to that journey.

In terms of clarifying the concept of gender, I will start with Harding's definition and move to expand that to better fit what I see to be the case. She saw gender as "an asymmetrical category of human thought, social organization, and individual identity and behavior" (1986, p. 55). These notions are reflected in Smith's (1992) comment that "gender is not so much a natural fact as a transcendental structure, a hinge on which life turns at any given moment rather than an alterable arrangement in life" (p. 6). What these quotes point out is that quite differently from one's sex, which is biologically determined

(to a large extent), gender is a cultural creation, and is therefore influenced by any number of characteristics above and beyond biological sex. Smith continues,

> The genders have often been conceived as psychic exfoliations of sex- as though the feminine and masculine intentional styles and their variants are directly stamped by female and male body structures and hormonal balances, and as though physical interactions among sexed bodies transfer directly into the interintentional realm ..This though is probably not entirely false but it misses the mark. (1992, p. 303).

The danger of embracing this simplistic and unnecessarily dualistic view is that it prevents us from focusing on all of the 'factors' that contribute to constructing one's gender, and from recognizing the full spectrum of the expressions genders can take. Narrow, stereotyped traits get assigned mostly on the basis of biological sex and behavior. Men, for instance, are often thought superior because of their capacity for rationality and scientific thought, capabilities often thought missing in females (Oakley, 1982). To resist this narrowness of conceptualization and to open up the possibility for a more accurate and critical representation of what contributes to and sustains one's gender, I argue for a broader definition of gender. This more expansive notion encompasses characteristics such as sex, age, ethnicity, 'race', sexual orientation, social class, ablebodiness, parental status, and perhaps many others that my limited positioning prevents me from acknowledging. While this seems to make gender an unwieldy concept, I would argue that previous notions were sanitized and barren, and that if in fact a multitude of factors do interact to form a gender identity, then as difficult as it may be, we as researchers are obligated to work within this more holistic conceptualization. This is not to imply, however, that this desire is fully actualized in the present study. The ability to successfully operate from this new standpoint of a more holistic notion of gender does not come overnight (or even over-semester). Still, what I have attempted to do is frame my exploration from the very outset in these more realistic terms, so that all I encountered along the way would be seen in a very different manner than the traditional, sanitized conception of gender would have allowed.

My exploration involved five male secondary science teachers, who at the outset simply shared a desire to work with me on a project involving their thoughts about science teaching. I had met all five teachers before this study started, but had known none of them for more than a few months, and didn't feel I knew any of them well. Nonetheless, based on our acquaintance, all five agreed to talk with me and to allow me access to their classrooms.

At the time of this study, all five men were public school science teachers. Two were chemistry teachers, one taught biology, one taught physics, and the fifth was an eighth grade earth science teacher. Their teaching experience ranged from between five and thirty-nine years. All five had some sort of science teaching credential (three had Master's degrees), and one participant was chairperson of his school's science department. Four of the men taught in suburban schools, and the fifth taught in an urban high school.

Despite the differences in their careers, lives and life histories, I think it is important to emphasize how homogeneous this sample is when thinking about interpreting what I found from the interviews. All five are of European dissent, all are married heterosexual fathers and four of them have partners that also work. All are members of the middle-class, although they all place themselves towards the lower end of the class. All teach in public schools in a mid-Atlantic state, and all live in the same state in which they teach. Four of the five men were science majors as undergraduates, so they decided to enter teaching, and took the appropriate course work, after they had earned Bachelor's degrees. They had all worked other jobs prior to entering the teaching profession. So, I think the amount of 'sameness' in this sample is extremely important to consider as I present and interpret the themes that arose from the data.

In reflecting on how I designed this exploration, I would say that it blends that perspectives of what Hammersley and Atkinson (1983) describe as the positivistic paradigm and the naturalistic paradigm. It is positivistic in the sense that my methodology

largely arises from that paradigm, especially because the interviews were semi-scripted, and because my voice was largely absent from the interview process- I asked the questions, and I didn't get asked many questions by the participants. This blended with what I see as the more naturalistic elements, namely that at times it was more of a conversation as I spontaneously probed responses, that I started with my subjects and my questions arose out of their positioning as male secondary science teachers, and that I was 'inside' the community, for I had taught high school science prior to returning to the university for full-time study. Realizing both the strengths and weaknesses of each paradigm, my methodological framework sought to minimize the disadvantages in each paradigm. I realize full well, however, that there would always be limitations to any methods I employed.

The primary mode of data collection was by means of semi-structured interviews. Because no single protocol existed that I felt would successfully tap into the teachers thoughts and feelings about their work and their gendered identities, I devised one using several existing protocols as guidelines (Clandinin et al., 1993; Fraser & Walberg, 1991; and Lortie, 1975). The protocol contained three sections: personal history, experiences with teaching, and experiences with science. While I at no time felt bound to the protocol, I did stick to it fairy closely, probing answers when I felt it was necessary and pursuing points that seemed "off track" as they came up. I interviewed each teacher twice, with anywhere from one to two weeks in between sessions, for a total time between 150 to 180 minutes. Tapes were transcribed, and data analysis proceed from here. Transcripts were coded and statements aggregated to yield the four major themes that I will discuss later in this paper.

Bearing in mind that interviewing is not an unproblematic method of data collection (i.e. Goode & Hatt in Oakley, 1982; Hollingsworth, 1994; Mischler, 1986; Oakley, 1982), I now want to address some of the strengths to this method, for these are the reasons that I chose to use it as my primary means of data collection. Interviewing is a form of discourse

between speakers (Mishler, 1986) that enabled me to "focus on how participants attach meaning to their activities and 'problems'" (Silverman, 1993, p. 19). Interviewing allowed me to tap into the respondents' "moral realities" in order to "provide access to how people account for both their troubles and their good fortunes" (Silverman, 1993, p. 114). I was able to engage in an active co-construction of knowledge and understanding with each respondent as I probed their perceptions and understandings of their own identities. They invited me to come to know them better. This is the privilege and the pleasure that interviewing affords. Still, I was ever aware of Seidler's caution that "it is hard to judge men's accounts of their own experience because often these personal accounts are not forthcoming" (1994, p. 109). Although I never felt that they were lying to me, I had to be cognizant of the notion that maybe I wasn't hearing their true feelings on a subject- which in itself is not a surprise given our level of acquaintance and the short duration of the interviews, relatively speaking.

In addition, then, to the use of interviews, which mostly proceeded by the use of a scripted protocol, I also visited each teacher's classroom on two separate occasions, recording data about classroom interactions (who interacts with whom) and fieldnotes. While I was able to collect a lot of both qualitative and quantitative data from these visits, none of it ended up seeming pertinent to the themes I culled from the interview transcripts. While feeling uneasy about not being able to triangulate my findings regarding the themes that arose from the interviews, I take solace in two notions. The first is the fact that many times during the interviews the teachers would offer answers that were extensive, often times answering questions that would show up later in the protocol. Rather than skip these already-answered questions when I got to them, however, I would ask them again. So at several points during a given interviewing session, the teacher would be asked to restate and clarify his views. The second point was raised by Silverman, who cautioned that "the major problem with triangulation as a test of validity is that, by counterposing different

contexts, it ignores the context-bound and skilful [sic] character of social interaction" (1993, p. 158).

After extensive reviewing of the interview transcripts, I was able to arrive at four recurring themes. These were: contradictory self-descriptions, issues of control, issues of autonomy, and views about the epistemology of science. I will talk about each of these themes in a bit more depth, offering snippets from the interviews as support for my claims.

The first theme, constructing your identity by defining what you are 'not', has several parts to it. They range from describing their role as teachers to describing personal characteristics. What is interesting is that the teachers consistently would answer my questions about how they perceived themselves by telling me what they were not. That is, they provided some contradictory self-descriptions. Theoretically, this idea makes sense, for things only get their definitions when there are other things to compare them to in order to see what they are not. In dealing with people, however, we usually define ourselves by describing what we are, rather than what we are not.

When asked to describe the relationship of gender to teaching, all of the respondents talked almost immediately about elementary education. Cabell asserted that "usually people do not associate male teachers with elementary education" unless a male enters with the desire to quickly become a principal. When probed as to the reasons for a lack of males in this area, he very quickly turned the conversation to women, saying

> C: .....I guess another thing would be is that women are attracted very much ah.....using very old idea OK one of the separations between men and women, OK, women, women who are part of the family where.....the old traditional thing where a man goes, he goes out and gets a job and the woman stays home and rears the children, OK. I, I think women are strongly attracted to the idea of teaching as a profession because they can be home.....teaching is a profession where you can be home when your children are home and can be working while they are in school, so you're paralleling what they do.

Rather than describing what prevents males from entering the profession, he describes what he feels draws females to the profession, though those desires could be equally

appealing to a male parent. Luke also describes what is not the case for science teaching. When describing subject areas, he assigns certain ones, such as English and home ec, feminine labels and he assigns other subjects, including phys ed, shop , and "maybe math", masculine labels, but he never describes where science fits in.

These teachers never explicitly describe themselves as masculine, but they do let on that they could not be viewed as traditionally feminine. Luke couldn't picture himself as an elementary school teacher because he didn't have "the more stereotypically feminine qualities to teach younger children, um, you have to mother them more". On the secondary level, he couldn't imagine being an English teacher (his lack of formal training aside) and noted,

> "and I don't know what qualities you need, I guess if you're going to teach poetry, ah, and get students to think about their feelings about certain things, those are not male qualities, you know certain writing, or get them to express themselves in writing, that's not a stereotypically male thing."

When asked if he felt it had been to his advantage to be a male in teaching, Zack was not firm in his thoughts, noting,

> "I think in society sure. It's always been a benefit to be a male, um, as opposed to a female. I don't know if it's necessarily true in teaching, but I think overall, um, it's a male dominated society in a lot of ways."

So, in this case he explicitly addressed his maleness, but was unsure about the impact that it had on teaching. This uncertainty also arose when the teachers were explicitly asked, at the end of the interviews, about this theoretical notion of the contradiction between science and teaching for both females and males. While they could clearly see that a contradiction may exist for females, and Luke had actually already "thought about it", they were less 'sold' on the notion of a contradiction for males. Cabell's dialogue was typical:

> WL: .....because they have one foot in something traditionally masculine and one foot in something traditionally feminine. So, without, without maybe being familiar at all with this literature, how does that notion strike you? As a plausible notion, as not very plausible?
>
> C: Very plausible.

WL: OK, flipping that around, what do you think of the contradiction of the male science teacher? For that, for those very same reasons. One foot in.....

C: Contradiction.....of.....a male science teacher? Why is it a contradiction? You just said that males.....OH, I see, for the teacher part of it as opposed to the science part of it. OK.

WL: Do you think it holds or no?

C: .....I never thought of it that way, ...um.....

WL: Want to pause? [pause the tape recorder so he can think]

C: [tape back on] OK, the question is are they reverses? Are the two concepts reverses, and my first, my first reaction to that was no, there is no contradiction cause no, there is no contradiction cause, cause I see I see a male science teacher because that uh, uh .....that, that uh, according to my previous answer I think that uh maybe science teachers have a little more esteem, a little higher regard, OK, that's more of a .....you still, you still need someone to teach that so that's a male thing so it's OK for a male to be a teacher.

In this exchange, while Cabell readily accepts the idea of the contradiction for the female (an idea he says he had not heard of before), he has a great deal of difficulty accepting it for the male. In the end, though he appears to have accepted it, he has in fact rejected it because science is seen as a masculine subject so it's OK for a male to teach it; this completely flies in the face of the reasoning that acknowledges the contradiction for females because even though teaching is feminized, science is not. The only way, it seems, to reconcile these simultaneously held views is to believe that the masculinized domain is always favored (takes precedent over) the feminized domain.

Luke also thinks the contradiction exists for women, but he too expresses some doubt about its existence for males.

L: Uh huh. I, I think it does exist, I don't, I mean I've thought about it actually, because you always think of the male science teacher, because I know so many female science teachers that I guess the question comes up to me fairly often, like your stereo-, stereotyped science teacher, you know, whether they think I am, and then I think about it and I know so many women who teach science, so I have wondered about their feelings about it, or whether it's a problem not for them personally, but the way their students view them, you know, whether they don't take them as seriously as scientists or not....ah....if, if the question is do I think it's a problem for them, you've gotta ask them

WL: Um-hmm

L: ....but I, I have thought of it, I'm, I think there could be um

WL: But, but you don't see the same conflict in an opposite way for males?

L: No.....science teacher?

WL: Yeah, a male and teaching

L: Ah.....no, because I guess of the stereotype of male science or math teacher, um, I don't see that as a conflict.

Like Cabell, Luke readily acknowledges the feasibility, if not the existence, of this contradiction for women, but fails to see what form it would take for men, since the stereotype is of a male science teacher.

While it is not surprising that these men would describe themselves as "not feminine", especially if that still is highly devalued by 'society', what is ironic is that all three respondents described themselves by attributing characteristics to themselves that would traditionally be viewed as feminine characteristics. They described these traits, however, in language that 'sounds' more masculine, rather than using the words normally associated with femininity. For instance, they would describe themselves as 'concerned' rather than 'nurturing', yet all expressed a joy and desire to work with young people. Cabell was attracted to teaching because "it's really nice to work with young people". After college graduation, Luke "started getting the feeling I'd rather work with young people than adults". Zack recommends teaching "if you like people and you like working with people". The same traits that females exhibited were shown in these teachers, but they went to great pains to call them something else. In fact, when a feminine label was associated with a trait, surprise was expressed that the trait was even noticed by anyone. Luke offers a good example.

L: ...I never expected a student to thank me for caring about their problems, you know, caring about other things other than science work, um, having them thanking me for teaching them stuff, caring about learning.

So, in terms of identity, and gendered identity in particular, these teachers often showed what they were by telling what they were not. This is not surprising, according to Allen (1993), who found that a recurring theme among the men he studied was "that teaching children was not an occupation a competent 'real man' would willingly choose" (p. 122). This notion, countered by, "If a man (in teaching) emphasized his masculinity too much, then he would undermine his legitimacy as a teacher" (Allen, 1993, p. 123) describes the rock and the hard place that many male teachers may find themselves between.

The second theme involves issues of control- control over the students, control over their own jobs, and sometimes even loss of control. While occasional references were made to controlling student behavior (C: I'd say that I have a strong discipline environment in the classroom") and to controlling students' futures (C: I don't try to push anyone into science and engineering except, except those that seem to be succeeding, very successful in my class"), the majority of the references to students involved controlling what and how they are learning. These ranged from the more subtle means of control to overt references to it. Towards the subtle pole, Zack's comment is typical.

> You know, I think that it is crucially important that they realize that it takes brain power just like if you're going to run 200 meters, you're gonna be, or a half mile or, you're gonna have to train. Well, you gotta train your mind too.

Likewise, Cabell voiced an urge to control the learning environment.

> Um, I would say that, that my major, my major teaching style is a lecture presentation. Um, what I, what I I try to do is I try to lecture, I use demonstrations and I use, I use [inaudible] I try to create images in the minds of the students. I want them to form images in their minds.

This second example illustrates the subtlety of these desires to control. At first glance, this seems like quite a reasonable thing for a teacher to say, but upon closer examination the elements of control come into focus. Not only does Cabell want to control *how* they learn

(which is necessarily limited by a heavy reliance on the lecture format), but he also wants to control *what* they learn (only those things that yield "images in the mind").

Notions of control become more obvious in other portions of the transcripts. These more overt references are usually framed in a positive light, such as Luke's "setting standards that I want them to achieve" or Cabell's view that "the strongest role I have is to create the proper learning environment". Occasionally, however, the desire to control was voiced in a more forward manner. Take Zack's contention, for instance.

> But, I think when I'm up there teaching, it's definitely, there's definitely, um, teacher-centered, you know, when I'm preparing. You know, I have an idea of what I want as an answer which is not as much as an academic [inaudible] exactly always one. I don't tell them answers, but I know what answers I want.

These teachers also frequently spoke about control of themselves and their jobs. Zack admitted that "I like to control things and that's one of the things I need to do is loosen up. I like to have a lot of control, you know". When describing the pluses of the teaching profession, Zack noted

> Uh, they like kids, they like being their own boss. I don't care what anybody says. An administrator is not your boss. You're your boss. You decide what is taught in your classroom on a daily basis. You organize what is done on a daily basis.

Cabell even extended this notion of control over one's self to include the urge to go to the bathroom. In describing a drawback to teaching, he notes

> .....if you feel a tremendous pressure [laughter] in, in you, a lot of times if you're in front of a class you just can't leave the classroom and go to the bathroom and then reduce that pressure You have to, you have to suck it up, and, and ah and, and even ah even endure pain.[2 skipped sentences] And so you have to put off even, even normal body functions, if need be.

This desire to control was also often voiced in 'loss of control' stories. Again, these occurred on the level of the student:

> WL: Describe the intellectual environment in you classroom.

> L: Um, that is lacking. I wish it was much more intellectual. Uh, I have trouble getting students to really think and participate and to present ideas, something I have to get better at I mean it has to do with the curriculum and the units used, um, the ability to stimulate conversation.

This loss of control was also voiced on the personal level. Cabell voiced it in reference to his own learning.

> ...I started out as a math major at Bucknell and then as we went further into the math curriculum, I realized that the concepts were becoming more and more abstract. I said, really, I said I'm doing all this.....work in manipulating these numbers and equations and all, I said but, I said it's not real, it doesn't feel real to me....

Luke discussed the loss of control in reference to his own pedagogy and a question about teaching an open-ended unit in biology.

> That's really hard to do. I find myself going good for a while and wow this unit's going well, this is great. Then it ends and you go Oh my God, what am I going to do? Which is the difficult part about not teaching straight from the textbook. With the textbook you always know what they'll be doing next....

In all of these cases of notions of control, some sort of power is at issue- whether it is the power to control the learning environment or the power to control what you choose to teach. Loss of control, then, might be interpreted as a loss of power. This, of course is not a desirable state, and we would expect that it would be described in a negative manner. This is very much in keeping with what Kupers (1993) identified as a prominent male theme, namely that "men view themselves, consciously or unconsciously, as at the top or the bottom of some hierarchy- and if at the top needing always to remain vigilant lest they fall or be thrown to the bottom" (p. 23). Kupers notes a rigid either/or quality to this theme, with men sensing no acceptable third alternative.

While the theme of control is more or less about power, the third theme, notions of autonomy, is about freedom from the power of others, or the lack of it. Issues about the notion of autonomy centered around the teachers' movement into the profession, decision-making, and the politics of their departments relative to the other departments in their

schools. In terms of their movement into the profession, all three men were undergraduate science majors who decided to enter teaching after they had graduated from college. When asked if they had any mentors or role-models as they headed into the profession, they responded:

> Z: No, I mean again, most of those teachers that I could talk about they were so far removed by the time I had made the decision I would say that almost all of the ones that were excellent and that I can really remember they made a difference, they were back in the sixth, seventh, and eighth grade.
>
> C: No I was on my own. [one skipped sentence] But I've always been a very independent person, and I've always wanted to do my own thing anyway....[one skipped sentence] ...I'm the only physics teacher here at [ ], so I had no mentor. Yeah, I would say pretty much, I've been on my own, I've never had a mentor as such.

This feeling of (almost delight in) autonomy is also voiced in reference to their present positions as teachers. Zack found teaching so attractive because he could be his own boss. "I've already said that the principal doesn't really affect what goes on in my classroom because he's never in my classroom", he notes. He also maintains his autonomy even with regard to the students.

> ...to provide and environment that allows then to experiment, to think and problem solve. That's what my role is. [three skipped sentences] They're the one whose responsibility is to learn, so if I do all of it for them, if I spoon-feed all of it and don't give them an opportunity to think about it then, you know, I might feel real good, but it's not going to do them any good at all.

So, Zack feels he has a responsibility to provide the correct environment, but the responsibility for learning lies with the students, allowing him to maintain some autonomy, and to some extent a degree of freedom from responsibility, even in light of their poor classroom performances.

The desirability of autonomy carries up to the department level as these teachers compare their science departments with the other departments in their schools. Both Zack and Cabell believe that their science departments have superior reputations within their schools, but that is not without its problems.

> Z: Okay, um, reputation is that, um, wherever I've been is that a lot of other departments feel that we're elitist in that we protect our subject a lot, and maybe not for the betterment of the school.[six sentences skipped] There's always been an attitude (on the pert of other departments) and it comes from having more periods of teaching.
>
> C: ....that when you have a very strong department, uh, other, other departments that might not be as strong tend to, tend to be a little jealous, I would say, and therefore might say, think of the science department as a whole as "ughh, you know, they, they might get things that we don't get, uh or they might be doing things which, which are getting them recognition that we're not getting", and so there might be some envy and jealousy.

Whereas these two are almost proud of the reputation that affords their departments so much autonomy (and notoriety), Luke laments that, "I don't think we have a reputation as being a real strong science department".

Autonomy, then, is another important 'state' that permeates many facets of both their days, on a short term time scale, and their careers, on a much longer time scale. It may be viewed as a prerequisite for the power that in turn enables them to control.

The final theme involves these teachers' views about the epistemology of science, and their perceived place within science. Since science is still largely viewed by proponents and critics alike as a masculinized domain, this theme offers important insights into how these men perceive their gendered identities. Throughout the interviews they spoke about both their views of science and their place within science. Zack described science as so interesting because "(i)t's practical, you can see it happening. It's more dynamic. It's alive, it smells, it makes noises". Cabell talked about his vision of science in his pedagogy. He remarked

> ...I don't do a lot of experiments, um, I do, I, I use more demos than experiments, and, and I think exper-, experiments are good for learning experimental methods, all right, but you can learn experimental methods, you, you don't have to do five hundred experiments to learn experimental methods.....

He seems to view it as a domain that is extremely process-oriented, and he therefore needs to justify why his teaching is not so process-oriented. In addition, Cabell relied more on stereotyped sex roles when describing who does science. He said,

> ...you learn science by interacting, interacting with things around you more than just in the home, the home environment, and ah so if women are more confined to the home than men were out there interacting with the world, type thing then they're going to be doing things like auto mechanics, and, and flying and such, things, things which involve more science and for which you need more technical information. So I think that that role was ascribed to more, more men than women.

The other aspect of science about which the teachers offered a good deal of information was their place within it. None of these teachers currently viewed themselves as a scientist, adopting what seems like a temporal definition of a scientist- you count as one if you are doing certain things at certain times. Those 'certain things' invariably involved participating in experimentation. When asked if they considered themselves a scientist,

> Z: I wouldn't view myself as a scientist. I wouldn't view, other people might not view me as a scientist.

Despite his undergraduate major, Luke has never viewed himself as a scientist.

> L: No.
>
> WL: Why not?
>
> L: And I never have really. I'm not, I don't like the laboratory situation, um, setting. I'm not that type of organized person, um, I've always been interested in science. I like to learn about it. I like to watch it, but I'm not so interested in doing it.

Cabell was probed the most on this issue, but his view of himself was like that of the others.

> WL: OK. Do you consider yourself a scientist?
>
> C: Eww.....no.
>
> WL: No? Why not?

C: I'm a teacher of science. OK, I learn and I teach, but I usually learn from books, and I teach, I teach from books.....and I really don't, don't learn from exp-, from, from uh doing things in industry, like, like....I think a scientist, to me a scientist is a person who does a lot of research....

[two lines skipped]

WL: OK. So, can you move from being a scientist throughout your lifetime?

C: Yep.

[four lines skipped]

WL: So it's what you're currently doing that defines whether you're a scientist or not?

C: I think so, I think so.

WL: What one characteristic would be used as your definition of a scientist? [two lines skipped]

C: I, I think a scientist is constantly observing, observing the world, whatever part of the world, some little part of the world, they're constantly observing something ah in, in, in a very critical way, and then they're, they're, they're performing experiments..... I think scientist are people working on problems to come up with solutions to those problems.

WL: And you don't think you do that?

C: .....I don't feel I do.

All five teachers, with Cabell's explanation being most compelling, describe science in a mechanistic, experiment-driven way, akin to the traditional masculinist representations of the domain, and contrary to the image of science that every recent reform has tried to portray. When Cabell was probed about when he tries something out in one period and then adjusts it slightly for the next period, and refines it a little bit more for the next period, he did not see that this was at all comparable with notions of scientific experimentation, so he still did not fit his own definition of a scientist.

Taken collectively, what do these themes, and the snippets of dialogue that comprise them mean? Not very much, to be honest. They are merely the start of a project designed to gain some insight into the self-perceptions of gender in this specific group of

teachers. This is not in any way intended to suggest that this study is worthless, or that it was not worth doing. Quite to the contrary, it already, with so few respondents and so little transcript, has started to identify characteristics and beliefs that contribute to the gendered selves of male secondary science teachers. My guarded reaction to the question 'what does all this mean?' was only to underscore the limited nature of the findings, and their tentativeness, as this was essentially a pilot study. The sample of five, as I stressed earlier, was extremely homogeneous, causing even more hesitation about pretending to have definitive results.

It is certainly a start, however. And it's a start the suggests many iterations. Certainly, a larger, and more diverse group of respondents would help add clarity to the conception of gender, especially if it is viewed as having so many constituent parts. Further, more explicit probing about gender and the teachers' thoughts about their own genders may prove useful.

In terms of potential implications of a more fleshed-out version of this exploration, I see many. A better understanding of all teachers' conceptions of gender could have profound impact on understanding the gender codes that teachers enforce in the classroom (Riddell, 1992) and on understanding the gendered nature of teaching in general (Kahle, 1990). Additionally, it could shed light on both recruitment and retention of teachers, male teachers in particular. It may also be helpful to understand teachers' views of themselves when considering implementing changes. More specifically, a better understanding of the gendered self-perceptions of male teachers may enable science education reformers fresh insights into how to go about the task of reshaping our masculinist (among other things) science and of empowering our devalued teachers.

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